

## **Three New Records of Gynodiastylid Cumaceans (Cumacea, Gynodiastylidae) from Korea**

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### **ABSTRACT**

Three species of the family Gynodiastylidae, *Gynodiastylis anguicephala* Harada, 1962, *G. tubicola* Harada, 1962 and *G. rotundicaudata* Gamô, 1961 are recorded newly to Korean fauna. New information on the mouthparts of these species is given, and the male of *G. rotundicaudatus* is described for the first time.

Key words: Cumacea, Gynodiastylidae, *Gynodiastylis*, Korea

### **INTRODUCTION**

The gynodiastylid cumaceans were reported with 58 species in six genera, *Allodiastylis*, *Dicoides*, *Gynodiastylis*, *Haliana*, *Sheardia* and *Zimmeriana*, over the world (Day, 1980; Băcescu, 1992). Among them, *Gynodiastylis* is the largest group in which 44 species, including most recent record of two new species, *G. jazdzewskii* and *G. laciniacristatus* from Antarctic and Australian waters respectively (Băcescu, 1992; Błażewicz and Heard, 1999; Gerken and Gross, 2000), have been reported. However, the cumaceans of this family have not been reported in Korea.

We examined cumacean specimens collected from shallow coasts of Korea from 1998 to 2001. As the result, three species in *Gynodiastylis* belonging to the family Gynodiastylidae turned out to be new records to the Korean fauna: *Gynodiastylis anguicephala* Harada, 1962, *G. tubicola*

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Harada, 1962 and *G. rotundicaudata* Gamô, 1961. These three species were described originally from the Japanese waters (Gamô, 1961; Harada, 1962). Among them, *G. rotundicaudata* was originally described on the basis of one female specimen (Gamô, 1961), its male was not known until now. We described the male of *G. rotundicaudata* and new characters of the mouthparts of the other species in the present paper. Drawings and measurements were performed with the aid of a drawing tube. Measurements for the body length were made from the anterior tip of carapace to the last abdominal segment, and for each appendage were made along the mid-line of segment, exclusive of the inflated outer angle. All examined specimens were deposited in the Department of Biological Science, Dankook University. The collectors are referred when the specimens were not collected by authors.

## DESCRIPTIONS

Order Cumacea Kröyer, 1846 올챙이새우목

Family Gynodiastylidae Stebbing, 1912 코올챙이새우과 (신칭)

Genus *Gynodiastylis* Calman, 1911 코올챙이새우속 (신칭)

***Gynodiastylis anguicephala* Harada, 1962** 곰보주름코올챙이새우 (신칭) (Figs. 1-3)

*Gynodiastylis anguicephala* Harada, 1962, p. 303, figs. 7, 8; Băcescu, 1992, p. 410.

*Gynodiastylis angicephala*: Gamô, 1963, p. 88; Gamô, 1968, p. 187.

*Gynodiastylis anguicephalus*: Day, 1980, p. 202.

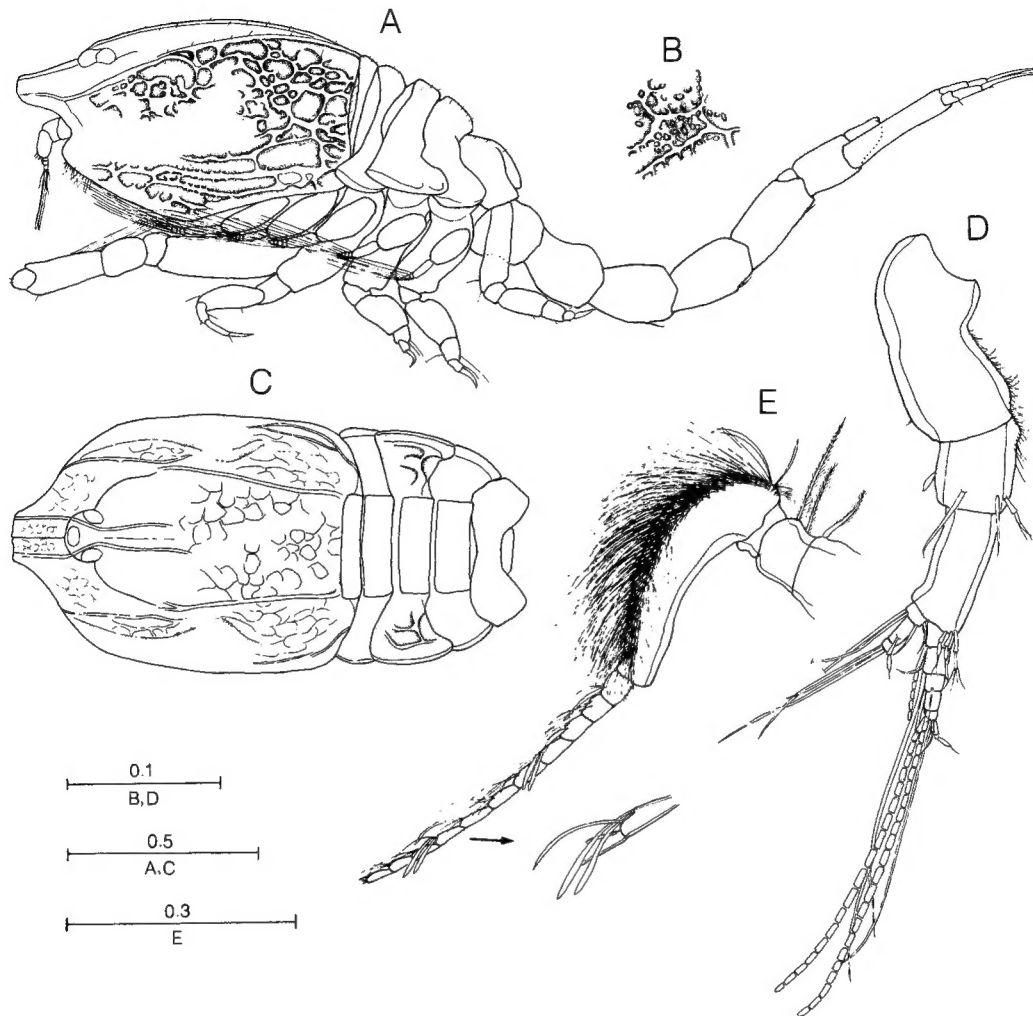
**Material examined.** 1 ♂, Namchang (Haenam-gun), May 20, 1998, 2 ♂♂, Daechoengdo Is. (Ongjin-gun), Aug. 10, 1998.

**Adult male:** Body length (Fig. 1A) about 2.5 mm, excluding telson and uropod, with hairs scattered on dorsal and lateral surfaces. Carapace (Figs. 1A, B, C) slightly longer than 1/3 of body length, about 1.35 times as long as its width and 1.75 times as long as its depth; shape nearly rectangular in dorsal view, deeply depressed at middle portion of both lateral sides; surface pitted, covered with numerous alveolate and reticulate sculptures; dorsal and lateral portions with several pairs of longitudinal ridges (or carinae) and numerous reticulate ridges. Antennal notch concaved; anterolateral angle rectangular, smooth. Pseudorostal lobe (Fig. 1C) truncated, about 1.8 times as long as ocular lobe; with 1 pair of longitudinal dorsal ridges running from apex to ocular lobe. Ocular lobe (Fig. 1C) oval, with 3 lenses; with 1 pair of submedian ridges running from apex to middle portion of carapace. Posterior portion of carapace (Figs. 1A, C) with 1 pair of long dorsolateral ridges running to each lateral margin of frontal lobe; anterior portion with 1 pair of frontolateral ridges; they not connected and running beyond dorsolateral ridges.

Thorax (Figs. 1A, C) about 3/5 of carapace length, longer than 1/5 of body length.

Abdomen (Fig. 1C) about 0.75 times as long as cephalothorax. Fifth segment longest, about 1.3 times as long as fourth one; sixth segment about 0.65 times as long as fifth one.

Antennule (Fig. 1D): Peduncle composed of 3 articles; first article subequal to remaining ones combined, with numerous hairs on inner margin, and 3 tiny setae and 2 simple setae near distal margin; second article slightly longer than 1/2 of third one, with 2 simple setae and 1 sensory seta near distal margin; third article with 3 sensory setae on inner corner and 1 simple seta on distal



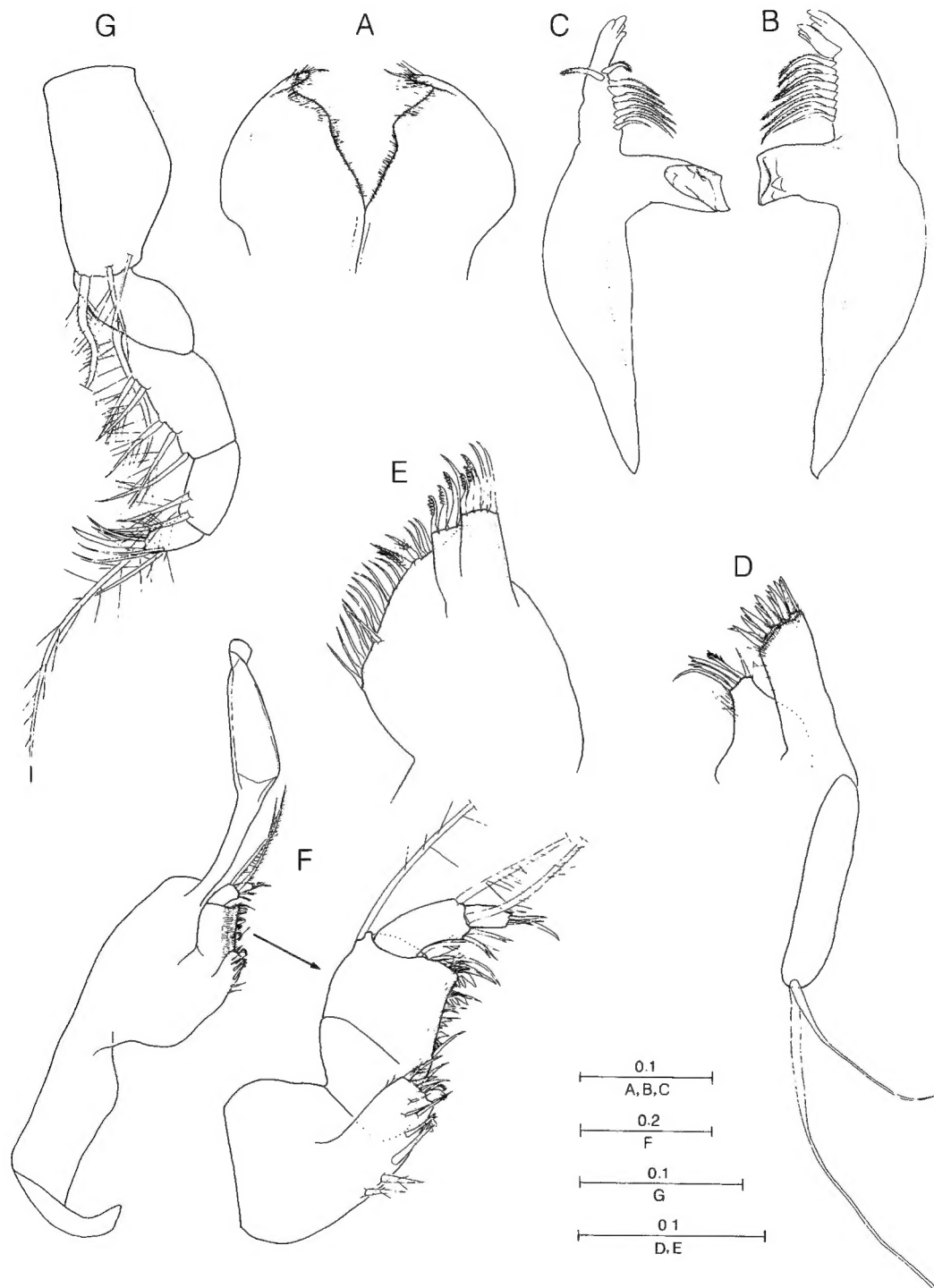
**Fig. 1.** *Gynodiastylis anguicephala* Harada, 1962, adult male. A, habitus, lateral; B, integument of carapace; C, cephalothorax, dorsal; D, antennule; E, antenna. Unit of scales in mm.

margin. Main flagellum composed of 5 articles; first article with 1 short aesthetasc on outer corner; second and third articles with 1 long simple seta respectively on outer corner; fourth article with 1 aesthetasc; fifth article with 1 aesthetasc, 1 long and 2 short simple setae, and 1 sensory seta. Accessory flagellum composed of 3 articles, about 0.55 times as long as main flagellum; first article with 2 long simple setae on outer corner and 2 short simple setae near inner corner; second article longest, with 1 sensory seta; third article with 3 long simple setae.

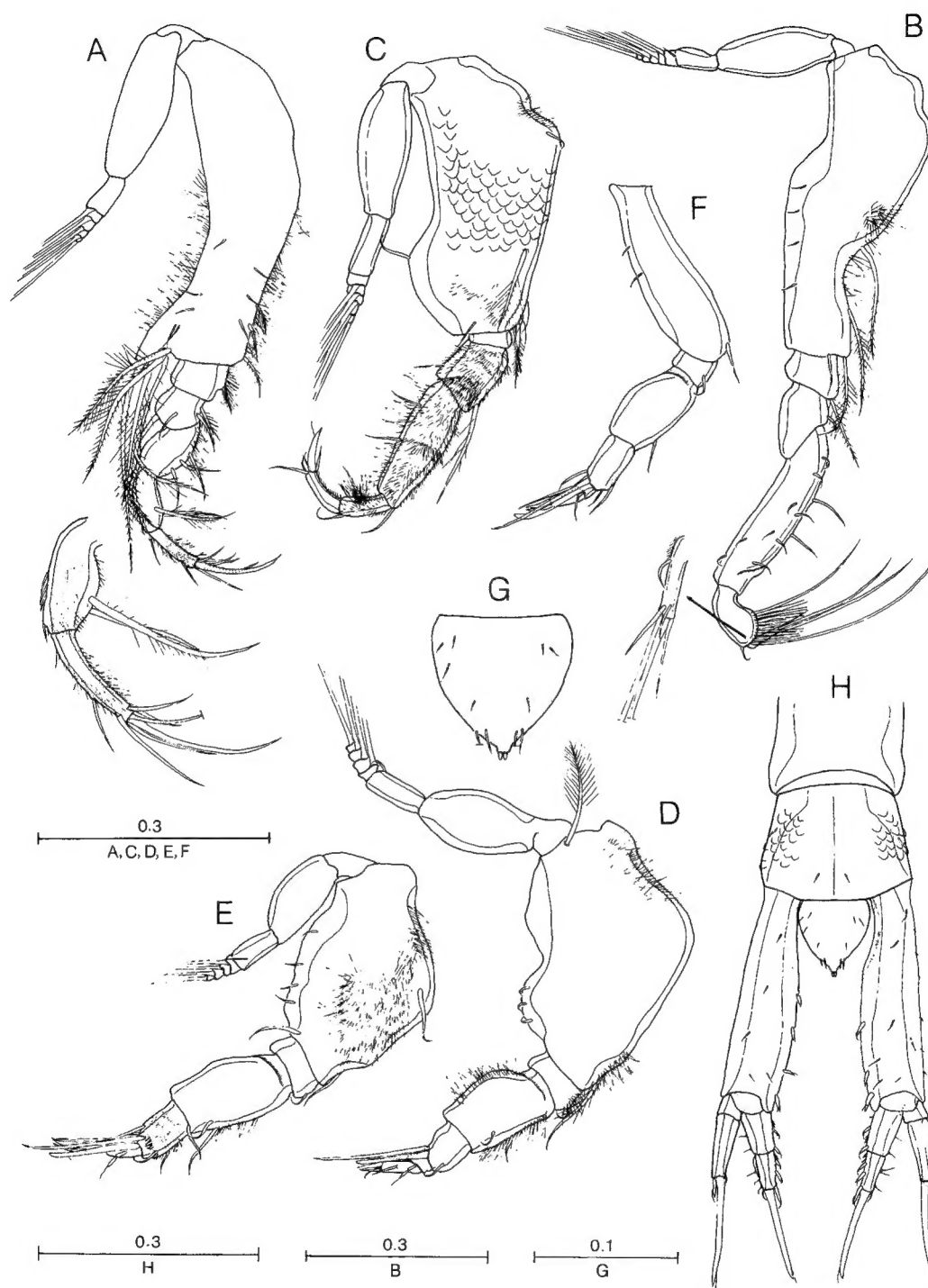
Antenna (Fig. 1E) short, not exceeding carapace. Peduncle composed of 4 articles; first article with 1 plumose seta; second article with 2 plumose setae. Flagellum composed of 11 articles.

Labium (Fig. 2A) with numerous hairs on inner margin; apex of process with 1 seta.

Left mandible (Fig. 2B) with 1 simple seta and 7 plumose setae between lacinia mobilis and pars



**Fig. 2.** *Gynodiastylis anguicephala* Harada, 1962, adult male. A, labium; B, left mandible; C, right mandible; D, first maxilla; E, second maxilla; F, first maxilliped; G, second maxilliped. Unit of scales in mm.



**Fig. 3.** *Gynodiastylis anguicephala* Harada, 1962, adult male. A, third maxilliped; B, first pereopod; C, second pereopod; D, third pereopod; E, fourth pereopod; F, fifth pereopod; G, telson; H, uropods, telson and last abdominal segment, dorsal. Unit of scales in mm.

molaris; pars incisiva with 4 teeth; lacinia mobilis with 3 teeth; pars molaris truncated, with 1 spiniform tooth near distal margin. Right mandible (Fig. 2C) with 1 simple seta and 8 plumose setae between pars incisiva and pars molaris; pars incisiva with 4 teeth; pars molaris with 1 spiniform tooth near middle portion.

First maxilla (Fig. 2D): Protopod with 1 simple seta on outer margin; terminal margin with numerous hairs and 14 simple spiniform setae. Palp long, with 2 filaments (one of them very long, about 1.6 times as long as palp). Endite with numerous hairs on outer margin; terminal margin with 2 simple setae, 1 pectinated seta and 2 bifurcated setae.

Second maxilla (Fig. 2E): Protopod with 1 row of 14 simple setae on inner margin. Endites exceeding protopod; inner endite with 3 comb-like setae and 1 simple seta; outer endite with 3 comb-like setae and 2 simple setae.

First maxilliped (Fig. 2F): Branchial apparatus without branchial processes. Carpus of protopod with numerous hairs, approximately 11 plumose setae and 4 peculiar comb-like setae; outer corner with 1 long plumose seta. Endite with 3 simple setae on surface, 2 plumose setae, 2 bifurcated simple setae and 2 hook-like spines on inner margin; terminal margin with 1 plumose seta, 1 bifurcated seta, 2 simple setae and 2 specialized teeth.

Second maxilliped (Fig. 2G): Basis about 0.6 times as long as remaining articles combined, with 2 plumose setae and 1 simple seta near distal margin. Capus with 5 plumose setae on inner margin. Dactylus about 0.65 times as long as propodus, with 5 simple distal setae near terminal margin and 1 strong terminal spine.

Third maxilliped (Fig. 3A): Basis about 1.45 times as long as remaining articles combined, with 8 simple setae on distal portion; inner and outer margins with numerous hairs distally; inner margin with 3 plumose distal setae; outer corner rather inflated, with 5 long plumose setae. Capus with numerous hairs, 2 simple setae and 1 plumose seta on inner margin; outer corner with 1 plumose seta. Propodus with 2 plumose setae on inner margin. Dactylus about 0.9 times as long as propodus, with 2 simple distal setae on outer margin; inner corner with 2 simple setae; terminal margin with 2 simple setae and 1 long setiform terminal spine; terminal spine about 1.5 times as long as propodus. Exopod well developed.

First pereopod (Fig. 3B): Basis subequal to remaining articles combined; outer margin with 4 hairy setae; inner margin with numerous hairs and 2 plumose setae at middle portion; distal margin with 1 simple seta and 2 plumose setae. Carpus about 1.9 times as long as ischium and merus combined, with 4 hairy setae on surface and 7 simple setae near inner margin. Propodus about 0.35 times as long as carpus, with approximately 10 very long setae; outer corner with 1 simple seta. Dactylus slightly longer than 1/2 of propodus, with 1 simple seta on outer margin; with 3 simple setae and 2 very long setae near terminal margin.

Second pereopod (Fig. 3C): Basis slightly shorter than remaining articles combined; surface with numerous hairs, 1 simple seta respectively at proximal and distal portion, 1 plumose seta at middle portion; inner corner with 2 plumose setae. Merus with numerous hairs on surface; outer margin with 1 simple distal seta; inner margin with 1 plumose distal seta. Carpus about 1.6 times as long as ischium and merus combined, with numerous hairs on surface; outer margin 2 simple medial setae; inner corner with 1 simple seta. Dactylus subequal to propodus length, with 4 short simple setae on terminal margin, and 1 terminal spine.

Third pereopod (Fig. 3D): Basis about 1.2 times as long as remaining articles combined, with 3 hairy setae on outer margin distally; inner margin with numerous hairs and 1 plumose seta at proximal portion, and numerous hairs and 1 simple seta at distal portion.

Fourth pereopod (Fig. 3E): Basis about 0.9 times as long as remaining articles combined, with numerous hairs on surface; inner margin with 4 hairy setae and 1 simple seta; outer margin with 2 simple setae.

Fifth pereopod (Fig. 3F): Basis about 0.85 times as long as remaining articles combined.

Telson and Uropod (Figs. 3G, H): Telson subcordate form, about 0.65 times as long as last abdominal segment, slightly longer than 1/3 of uropodal peduncle; dorsal surface with 3–4 pairs of hairy setae; terminal margin with 1 pair of small spines. Uropodal peduncle about 1.75 times as long as last abdominal segment, with 3–4 spines on inner margin and 6 hairy setae near outer margin; dorsal surface with 5–7 hairy setae. Endopod composed of 2 articles, about 0.4 times as long as peduncle; first article slightly longer than second one, with 2 spines on inner margin and 2 sensory setae on outer margin; second article with 3 spines on inner margin, and 3 sensory setae and 1 short seta on outer margin, and 1 long terminal spine; long terminal spine subequal to endopod. Exopod composed of 2 articles, subequal to endopod; second article about 0.7 times as long as endopod, with 1 distal seta on inner margin, and 2 terminal spines (one of them long).

**Remarks.** Our specimens are well accorded with the original description (Harada, 1962). However, a few differences are found between our specimens and type specimens: (1) in our specimens a pair of dorsolateral ridges which are commenced from posterior margin of carapace are not connected with a pair of frontolateral ridges on the carapace, while they run anteriorly to be merged with frontolateral ridges in the original description; (2) the basis of third maxilliped has 5 plumose setae on the outer corner in our specimens, while in Harada's figure it is furnished with 3 plumose ones; (3) in the original description the length of the telson is subequal to the last abdominal segment, while it is about 2/3 in our specimens; (4) in the original description the first article of the uropodal endopod is slightly shorter than the length of the second one, while it is slightly longer than second one in our specimens. Also, according to the original description the peduncle of the male antenna is composed of 3 articles, while in our specimens it is composed distinctly of 4 ones as other species recorded by Hale (1946). This discrepancy seems to be caused by Harada's mistake in dissecting procedure.

**Distribution.** Korea (Yellow Sea and South Sea), Japan.

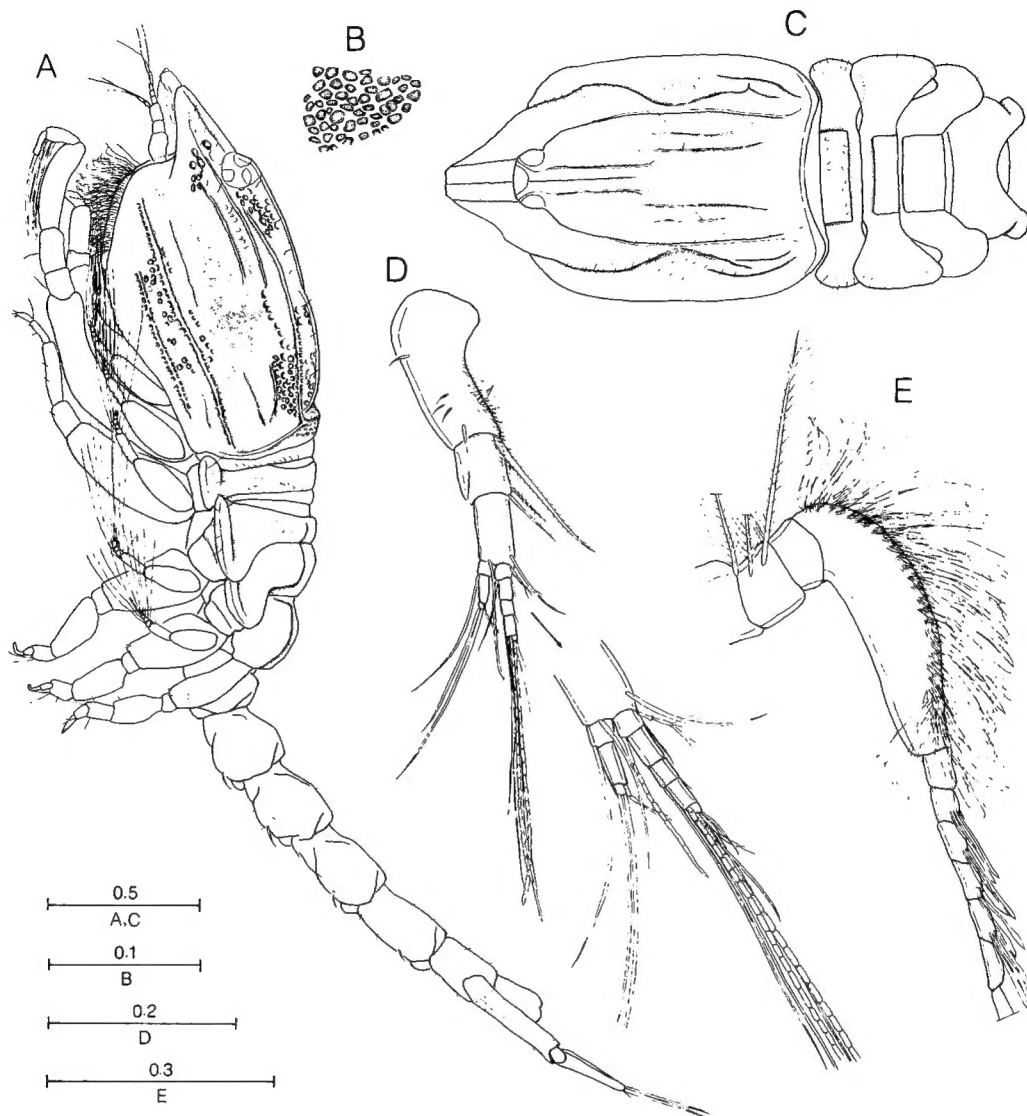
#### ***Gynodiastylis tubicola* Harada, 1962 주름코올챙이새우 (신칭) (Figs. 4-6)**

*Gynodiastylis tubicola* Harada, 1962, p. 299, figs. 4-6; Gamô, 1963, p. 88; 1968, p. 187; Băcescu, 1992, p. 417.

*Gynodiastylis tubicolus*: Day, 1980, p. 202.

**Material examined.** 1 ♂, Nohwado Is. (Wando-gun), May 23, 1998, 1 ♂, Ulgi (Ulsan-si), Apr. 20, 1999, C. Y. Chang.

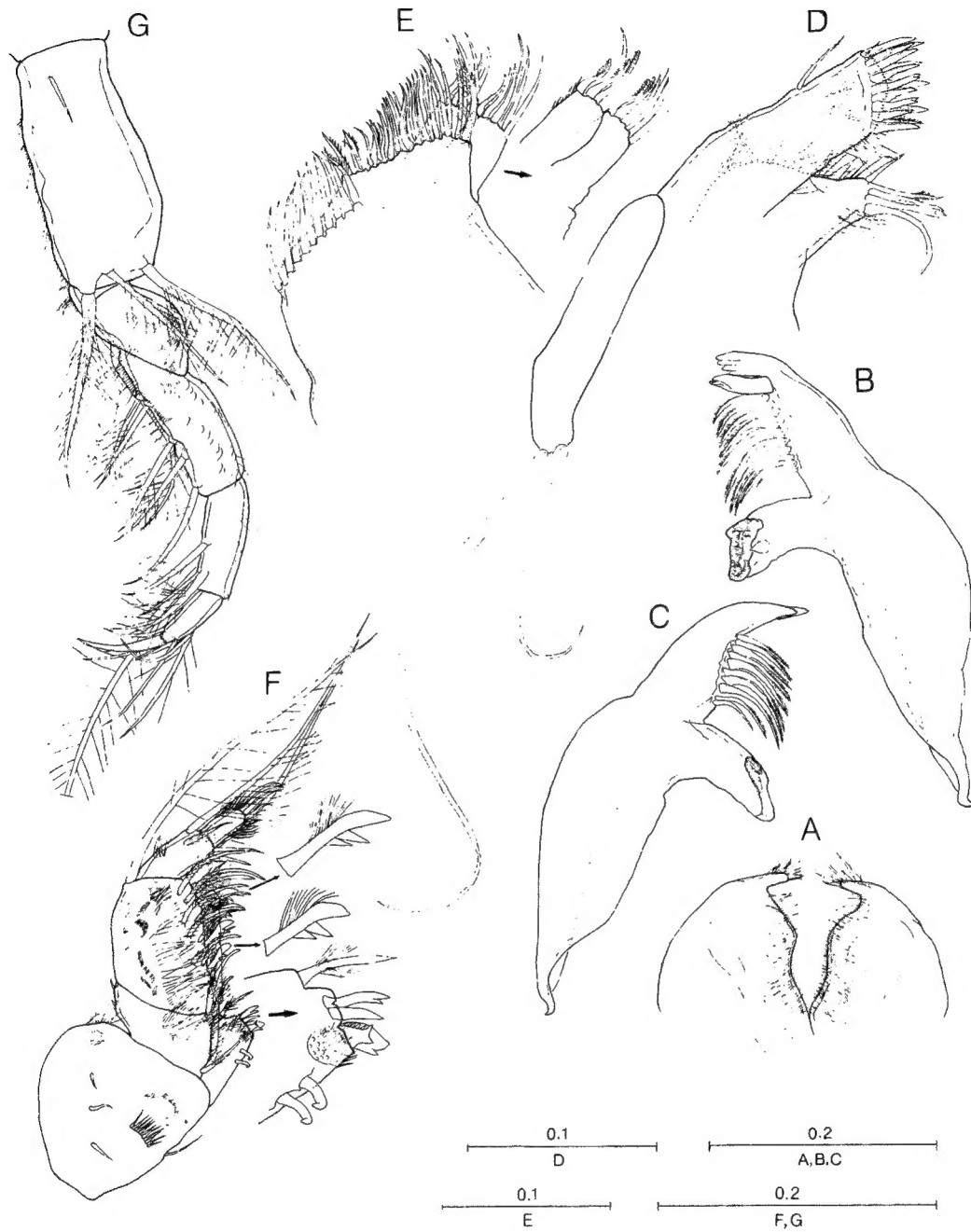
**Adult male:** Body length (Fig. 4A) about 3.3 mm, excluding telson and uropod, with hairs scattered on dorsal and lateral surfaces. Carapace (Figs. 4A, B, C) slightly longer than 1/3 of body length, about 1.5 times as long as its width and twice as long as its depth; shape nearly rectangular in dorsal view, deeply depressed at middle portion of both lateral sides; surface pitted, covered with



**Fig. 4.** *Gynodiastylis tubicola* Harada, 1962, adult male. A, habitus, lateral; B, integument of carapace; C, cephalothorax, dorsal; D, antennule; E, antenna. Unit of scales in mm.

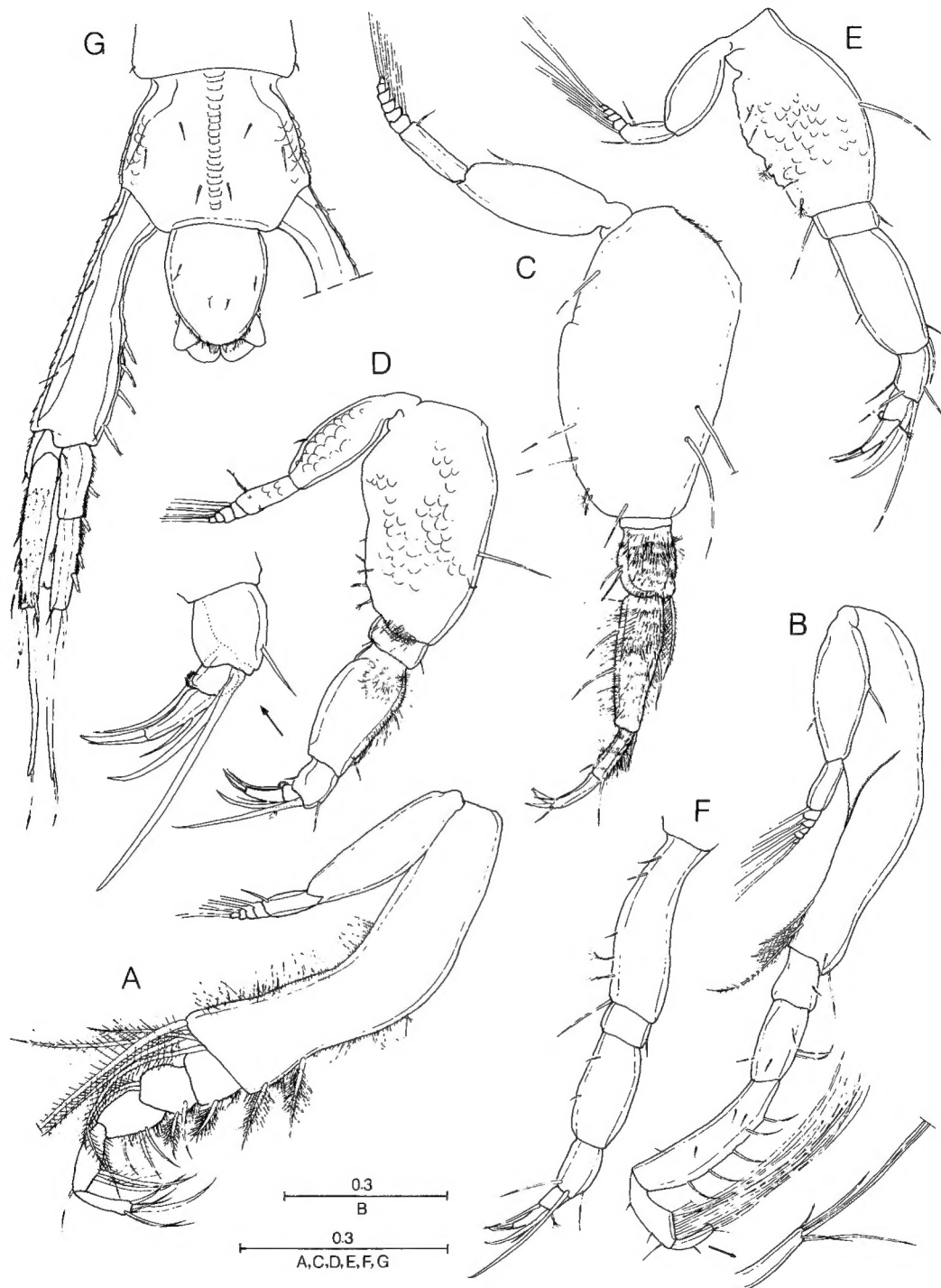
numerous small alveolate sculptures; dorsal and lateral portions with several pairs of long and short longitudinal ridges (or carinae). Antennal notch shallowly concaved, and antero-lateral angle obtuse, smooth. Pseudorostral lobe (Fig. 4C) truncated, about 2.3 times as long as ocular lobe; with 1 pair of longitudinal dorsal ridges running from apex to ocular lobe. Ocular lobe (Fig. 4C) oval, with 3 lenses; with 1 pair of submedian ridges running from apex to middle portion of carapace. Posterior portion of carapace (Figs. 4A, C) with 1 pair of long dorsolateral ridges connected with each lateral margin of frontal lobe; with 2 pairs of short ridges between the submedian ridge and dorsolateral ridge. Lateral side of carapace with 7-8 long and short ridges.





**Fig. 5.** *Gynodiastylis tubicola* Harada, 1962, adult male. A, labium; B, left mandible; C, right mandible; D, first maxilla; E, second maxilla; F, first maxilliped; G, second maxilliped. Unit of scales in mm.

Thorax (Figs. 4A, C) slightly shorter than  $2/3$  of carapace length, longer than  $1/5$  of body length. Abdomen (Fig. 4A) about 0.65 times as long as cephalothorax. Fifth segment longest, subequal



**Fig. 6.** *Gynodiastylis tubicola* Harada, 1962, adult male. A, third maxilliped; B, first pereopod; C, second pereopod; D, third pereopod; E, fourth pereopod; F, fifth pereopod; G, uropods, telson and last abdominal segment, dorsal. Unit of scales in mm.

to fourth one; sixth segment about 0.75 times as long as fifth one.

Antennule (Fig. 4D): Peduncle composed of 3 articles; first article slightly longer than remaining ones combined, with numerous hairs distally and 4 short simple setae on surface; with 1 simple seta and 1 strong plumose seta near distal margin; second article slightly shorter than third one, with 2 simple setae on inner corner; third article with 2 simple setae and 1 sensory seta near on distal margin. Main flagellum composed of 5 articles; second article with 1 long simple seta on inner corner; second article with 1 long simple seta on inner corner; fourth article with 1 aesthetasc and 1 long simple seta; fifth article small, with 1 aesthetasc, 1 long and 1 short simple setae, and 1 sensory seta. Accessory flagellum composed of 3 articles, about 0.6 times as long as main flagellum; second article longest, with 1 sensory seta; third article small, with 2 long simple setae.

Antenna (Figs. 4A, E) short, not exceeding carapace. Peduncle composed of 4 articles; first article with 1 plumose seta; second article with 2 plumose setae.

Labium (Fig. 5A) with numerous hairs on inner margin; apex of process with 1 spiniform seta.

Left mandible (Fig. 5B) with 1 simple seta and 9 plumose setae between lacinia mobilis and pars molaris; pars incisiva with 4 teeth; lacinia mobilis with 3 teeth; pars molaris truncated, with 1 spiniform tooth near distal margin. Right mandible (Fig. 5C) with 1 simple setae and 9 plumose setae between pars incisiva and pars molaris; pars incisiva with 3 teeth.

First maxilla (Fig. 5D): Protopod with 1 plumose seta on outer margin; terminal margin with numerous hairs, 11 simple spiniform setae, 2 bifurcated spiniform setae and 1 pectinated spiniform seta. Palp long, with 2 filaments (one of them very long, about twice as long as palp). Endite with numerous hairs on outer and inner margins; terminal margin with 2 simple setae, 1 plumose seta and 2 bifurcated setae.

Second maxilla (Fig. 5E): Protopod with 1 row of 10 simple setae and 1 plumose seta on inner margin; terminal margin with 3 pectinated spiniform setae, approximately 23 simple setae and 1 strong plumose seta. Endites exceeding protopod; inner endite with 3 comb-like setae and 1 simple seta; outer endite with 2 comb-like setae and 4 simple setae.

First maxilliped (Fig. 5F): Carpus of protopod with numerous hairs, approximately 11 setae, 4 specialized comb-like setae; outer corner with 1 long plumose seta. Endite with 1 plumose seta, 1 bifurcated spiniform seta, 1 spiniform seta and 2 specialized teeth on terminal margin; inner margin with 2 hook-like spines.

Second maxilliped (Fig. 5G): Basis about 0.6 times as long as remaining articles combined, with 3 strong plumose setae near distal margin; inner margin with numerous hairs. Capus with numerous hairs on surface; inner margin with 5 plumose setae. Dactylus about 0.6 times as long as propodus, with 6 simple distal setae near terminal margin, and 1 strong terminal spine.

Third maxilliped (Fig. 6A): Basis about 1.5 times as long as remaining articles combined; inner and outer margins with numerous hairs distally; inner margin with 2 plumose distal setae; outer corner rather inflated, with 5 long plumose setae. Capus with numerous hairs, 2 simple setae and 1 plumose seta on inner margin; distal margin with 1 plumose seta. Propodus with 2 plumose setae on inner margin. Dactylus about 0.75 times as long as propodus, with 3 simple setae on outer corner; inner corner with 2 simple setae; terminal margin with 1 long setiform spine; terminal spine about 1.5 times as long as propodus. Exopod well developed.

First pereopod (Fig. 6B): Basis about 0.9 times as long as remaining articles combined; outer margin with 3 long plumose setae distally; inner margin with 1 hairy seta and 1 simple seta. Merus about 1/2 of carpus, with 3 hairy setae on surface; inner margin with 2 simple setae. Carpus about 1.25 times as long as ischium and merus combined, with 4 hairy setae on surface; inner margin with 5 simple setae. Propodus about 0.45 times as long as carpus, with approximately 14 very long setae; outer margin with 2 hairy setae and 1 simple seta. Dactylus slightly longer than 1/2 of propodus, with 1 hairy medial seta on outer margin, and 4 simple setae and 2 very long setae near terminal margin.

Second pereopod (Fig. 6C): Basis slightly shorter than remaining articles combined, with 6 simple setae and 2 sensory setae on surface; outer margin with numerous hairs proximally. Ischium very short. Merus with numerous hairs on proximal surface; outer margin with 2 simple medial setae; inner margin with 1 plumose distal seta. Carpus about twice as long as ischium and merus combined, with numerous hairs on surface; outer margin 2 simple medial setae; inner margin with 1 simple medial seta; inner corner with 1 simple seta. Dactylus slightly shorter than propodus, with 3 short simple setae on terminal margin, and 1 terminal spine.

Third pereopod (Fig. 6D): Basis subequal to remaining articles combined, with 3 hairy setae, 3 sensory hairs, 3 simple setae on surface; distal margin with numerous hairs.

Fourth pereopod (Fig. 6E): Basis about 0.75 times as long as remaining articles combined, with 3 hairy setae, 2 sensory hairs and 1 simple seta on surface; distal margin with 2 simple setae.

Fifth pereopod (Fig. 6F): Basis about 0.7 times as long as remaining articles combined.

Telson and Uropod (Fig. 6G): Telson round form, about 0.8 times as long as last abdominal segment, subequal to 1/2 of uropodal peduncle; dorsal surface with 3 pairs of hairy setae; lateral margin with 1 pair of bristles; terminal margin with numerous hairs, 1 pair of spines and bristles. Uropodal peduncle about 1.65 times as long as last abdominal segment, with 4 spines on inner; outer margin serrated, with 4 hairy setae. Endopod composed of 2 articles, about 0.65 times as long as peduncle; first article about 0.8 times as long as second article, with numerous hairs, 2 spines on inner margin; second article with numerous hairs and 2 inner spines on inner margin, and 2 sensory setae on outer margin; terminal margin with 1 short seta and 2 terminal spines (one of them very long); long terminal spine subequal to endopod. Exopod composed of 2 articles, slightly longer than endopod; first article about 1/3 of second article; second article slightly shorter than endopod, with 1 distal seta on inner margin and numerous hairs and 3 setae on outer margin, and 2 terminal setae (one of them long); long terminal spine equal to terminal spine of endopod.

**Remarks.** Our specimens are well accorded with the original description (Harada, 1962). The species has hairs scattered on the body surface (although Harada did not mention in his original description). We added newly the characters of the antennule, the pereopods and the mouthparts of the male.

**Distribution.** Korea (South Sea), Japan.

***Gynodiastylis rotundicaudata* Gamô, 1961 큰꼬리코울챙이새우 (신칭) (Figs. 7-11)**

*Gynodiastylis rotundicaudatus* Gamô, 1961, p. 109, figs. 3, 4; Gamô, 1963, p. 88; Day, 1980, p. 202.

*Gynodiastylis rotundicaudata*: Gamô, 1968, p. 186; Băcescu, 1992, p. 416.

**Material examined.** 1 ♀, Namchang (Haenam-gun), May 20, 1998, 1 ♂, Yeongheungdo Is. (Ongjin-gun), June 4 1998, 1 ♂, Sinjindo Is. (Tae-an-gun), Apr. 3 1999, 1 ♀, Baeknyeongdo Is. (Ongjin-gun), Oct. 14 2000, 1 ♂, Oenarodo Is. (Koheung-gun), June 4 2001.

**Adult male:** Body (Fig. 7A) length about 2.4–3.3 mm, excluding telson and uropod. Carapace (Figs. 7A, B) slightly longer than 1/3 of body length, about 1.55 times as long as its width, twice as long as its depth; shape nearly rectangular in dorsal view; surface glossy and smooth. Antero-lateral angle obtuse. Pseudorostal lobe truncated, slightly longer than twice as long as ocular lobe. Ocular lobe much wider (about 2 times) than long, with 3 lenses.

Thorax (Figs. 7A, B) slightly longer than carapace length, 1/5 of body length. Second segment widest; fifth segment longest.

Abdomen (Fig. 7A) about 0.75 times as long as cephalothorax. Fifth segment longest, subequal to fourth one.

Antennule (Fig. 7C): Peduncle composed of 3 articles; first article slightly longer than remaining articles combined, with numerous hairs and 1 strong plumose seta distally on outer margin; second article with 1 sensory seta and 1 simple seta on outer corner; third article with 2 simple distal setae on surface; distal margin with 2 simple setae and 3 sensory setae. Main flagellum composed of 5 articles; third article with 1 long simple seta on outer corner; fourth article with 1 aesthetasc; fifth article small, with 1 long simple seta, 1 aesthetasc, 1 sensory seta and 1 simple seta. Accessory flagellum composed of 3 articles, slightly longer than first and second ones of main flagellum combined; first article with 2 simple setae on distal margin; third article very small, with 3 long simple setae.

Antenna (Figs. 7A, D) very short, not exceeding carapace. Peduncle composed of 5 articles; second article with 1 plumose seta on surface; flagellum composed of 11 articles.

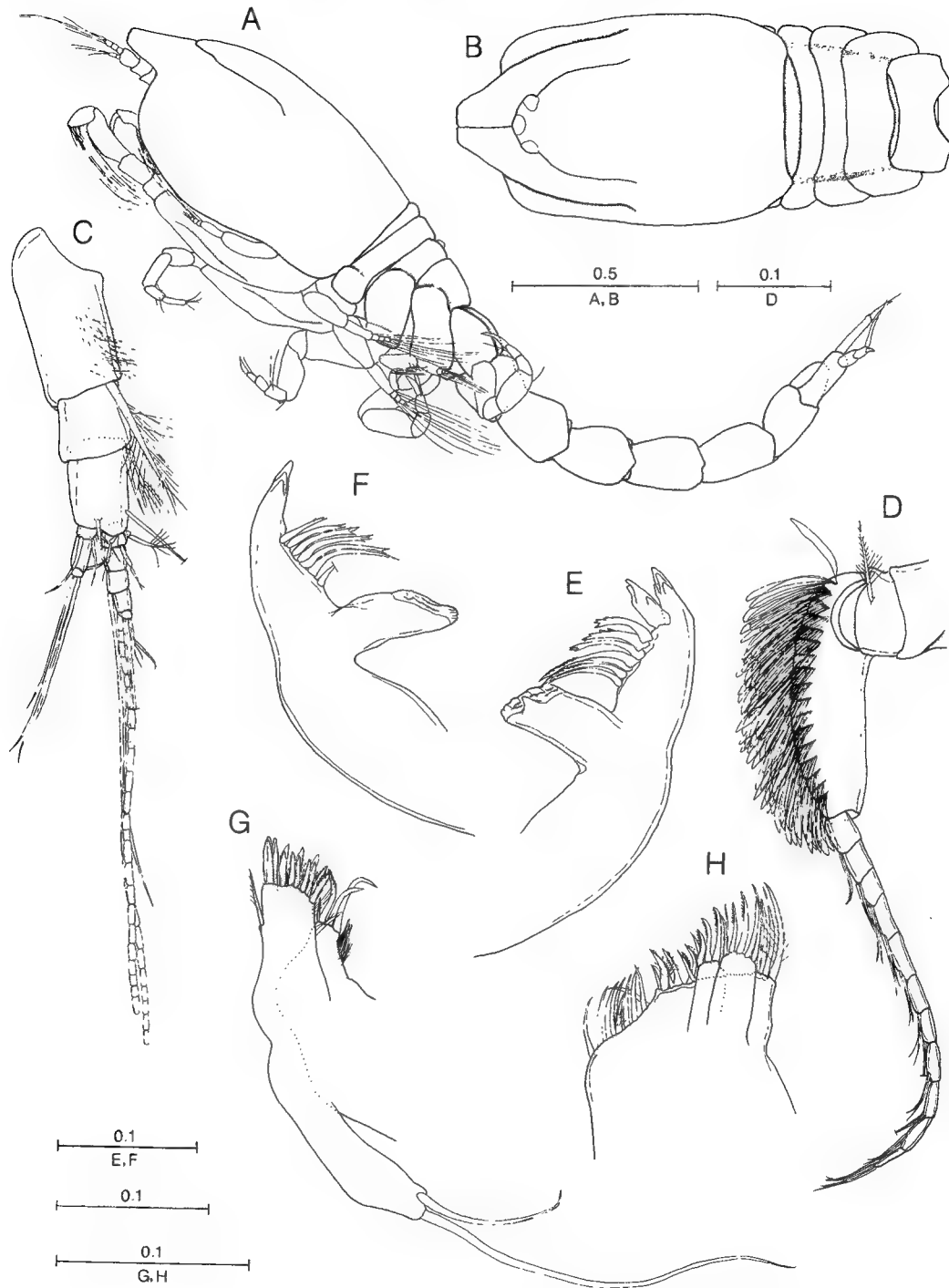
Left mandible (Fig. 7E) with 1 simple seta and 6 serrated setae (three of them bifurcated) between lacinia mobilis and pars molaris; pars incisiva with 4 teeth; lacinia mobilis with 3 teeth; pars molaris truncated, with 1 spiniform tooth near distal margin. Right mandible (Fig. 7F) with 2 simple setae and 5 bifurcated setae between pars incisiva and pars molaris; pars incisiva with 3 teeth.

First maxilla (Fig. 7G): Protopod with 1 plumose seta on outer margin; terminal margin with numerous hairs, 12 simple spiniform setae and 2 pectinated spiniform setae. Palp long, with 2 filaments (one of them very long, about 1.7 times as long as palp). Endite with numerous hairs on inner margin; terminal margin with 3 simple setae and 1 pectinated seta.

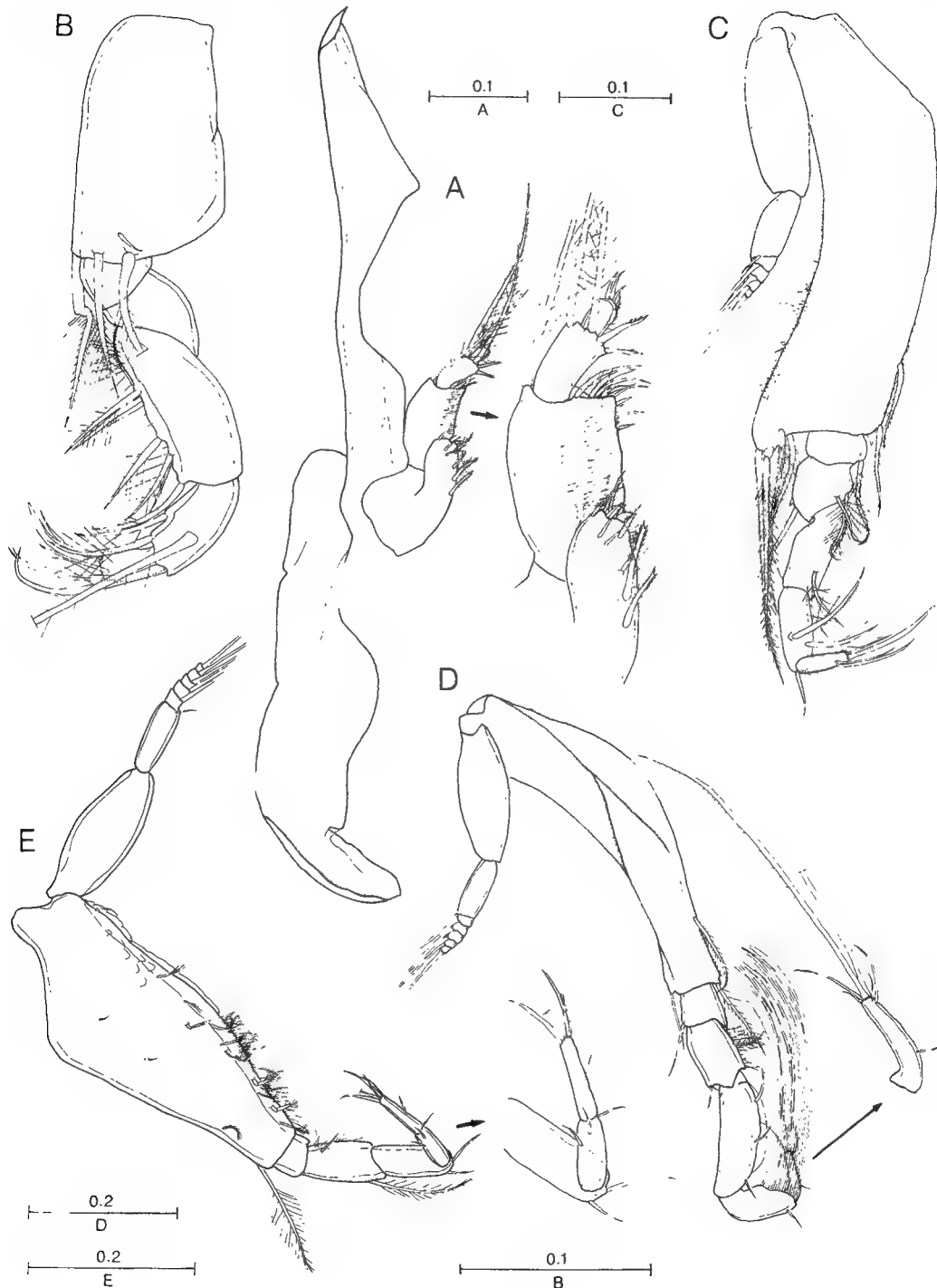
Second maxilla (Fig. 7H): Protopod with 1 row of 10 simple setae and 1 plumose seta on inner margin. Endites exceeding protopod; inner endite with 3 comb-like setae and 1 simple seta; outer endite with 2 comb-like setae and 3 simple setae.

First maxilliped (Fig. 8A): Branchial apparatus without branchial processes. Carpus of protopod with numerous hairs, approximately 9 setae and 4 specialized comb-like setae; outer corner with 1 long plumose seta. Endite with 1 plumose seta, 3 simple setae and 2 teeth on terminal margin; with 3 simple setae and 3 plumose setae (two of them bifurcated) on surface; inner margin with 2 hook-like spines.

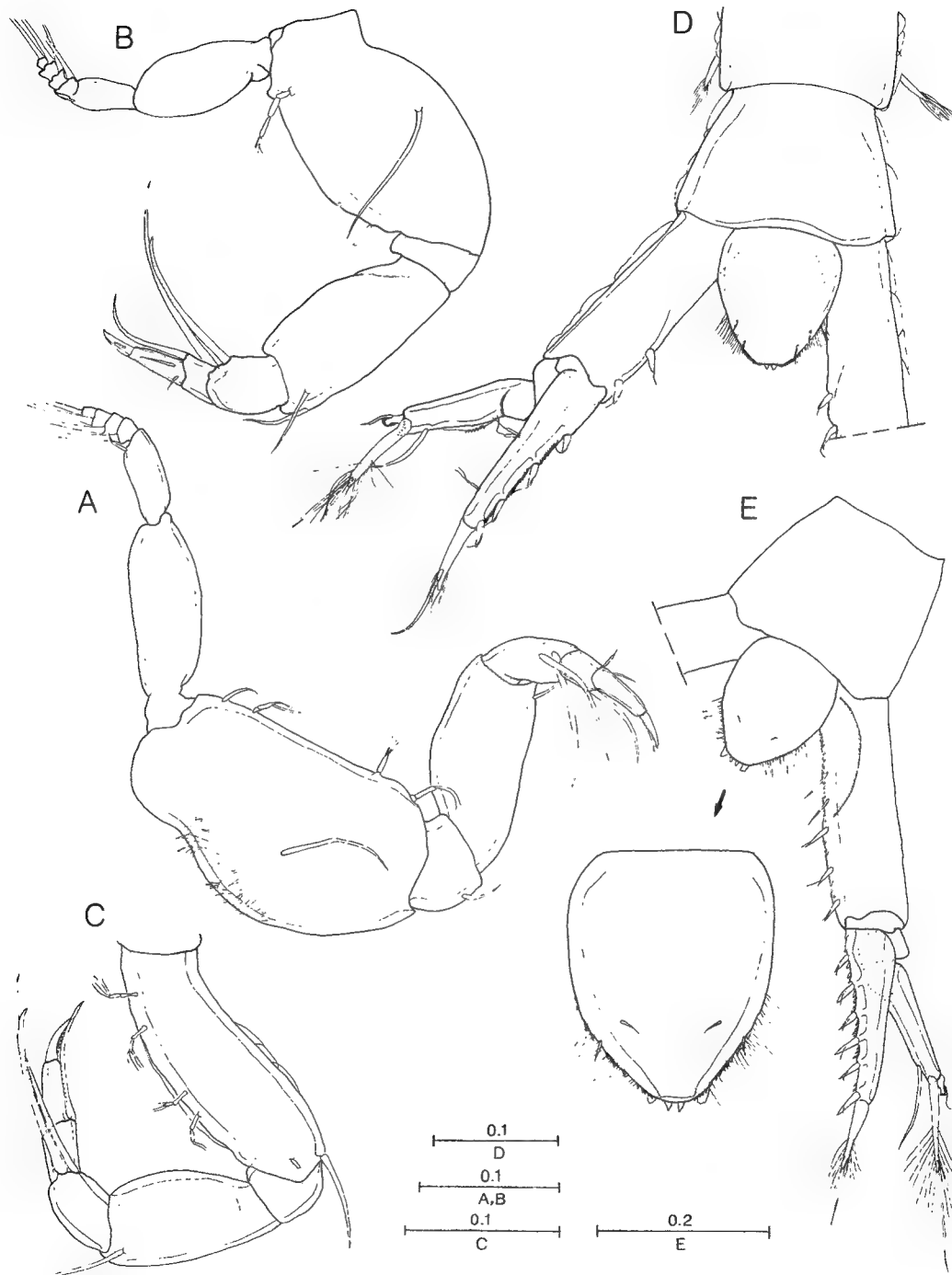
Second maxilliped (Fig. 8B): Basis about 0.65 times as long as remaining articles combined, with 1 simple seta and 3 strong plumose setae near distal margin. Capus with 1 simple seta and 5 plumose setae on inner margin. Dactylus about 0.55 times as long as propodus, with 6 simple



**Fig. 7.** *Gynodiastylis rotundicaudata* Gamô, 1961, adult male: A, habitus, lateral; B, cephalothorax, dorsal; C, antennule; D, antenna; E, left mandible; F, right mandible; G, first maxilla; H, second maxilla. Unit of scales in mm.

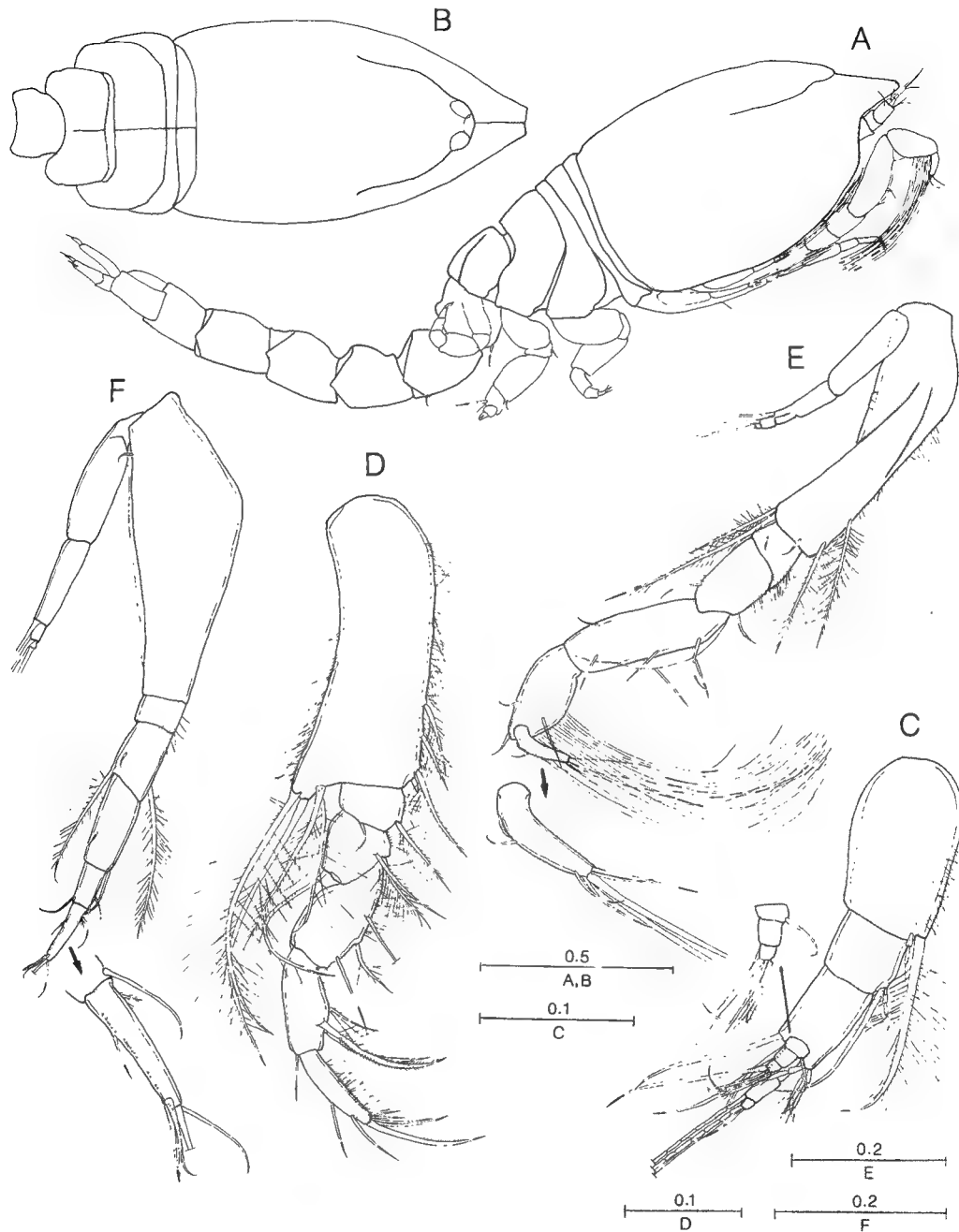


**Fig. 8.** *Gynodiastylis rotundicaudata* Gamô, 1961, adult male: A, first maxilliped; B, second maxilliped; C, third maxilliped; D, first pereopod; E, second pereopod. Unit of scales in mm.



**Fig. 9.** *Gynodiastylis rotundicaudata* Gamô, 1961, adult male: A, third pereopod; B, fourth pereopod; C, fifth pereopod; D, uropods, telson and last abdominal segment, dorsal; E, uropods, telson and last abdominal segment of other specimen, dorsal. Unit of scales in mm.

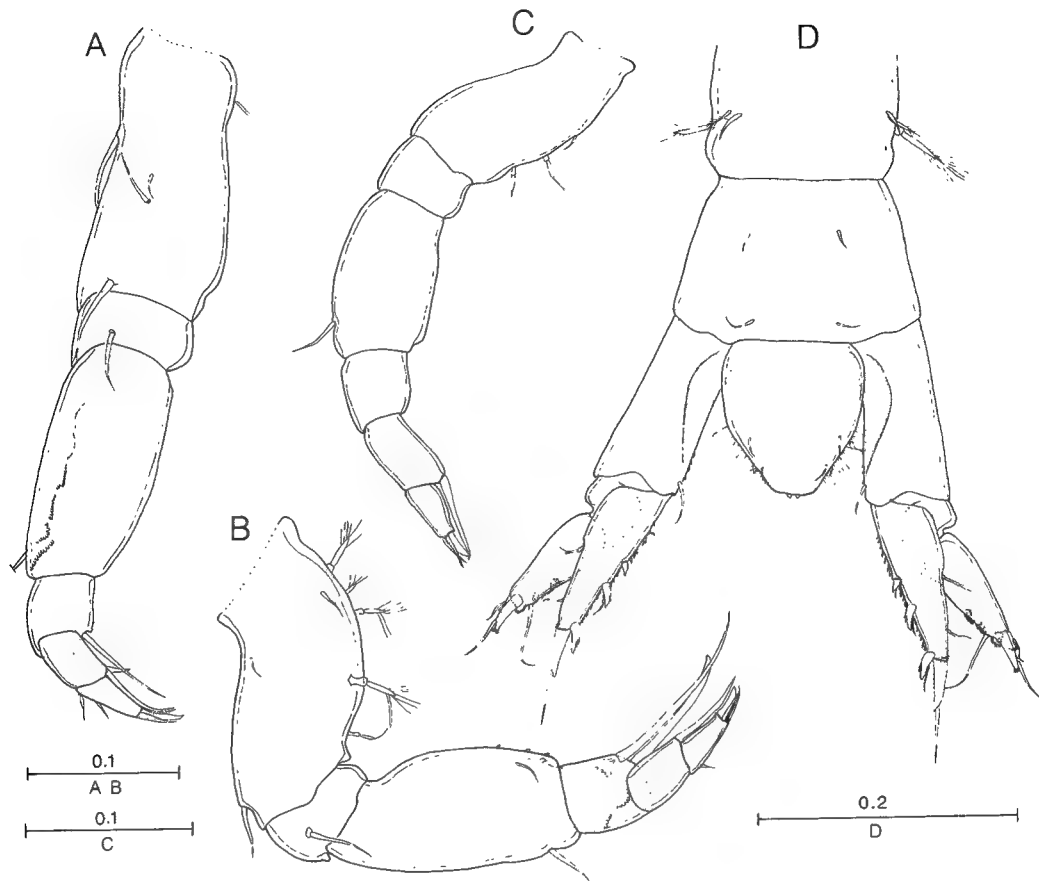




**Fig. 10.** *Gynodiastylis rotundicaudata* Gamô, 1961, subadult female: A, habitus, lateral; B, cephalothorax, dorsal; C, antennule; D, third maxilliped; E, first pereopod; F, second pereopod. Unit of scales in mm.

distal setae near terminal margin, and 1 strong terminal spine.

Third maxilliped (Fig. 8C): Basis about 1.45 times as long as remaining articles combined; inner



**Fig. 11.** *Gynodiastylis rotundicaudata* Gamô, 1961, subadult female: A, third pereopod; B, fourth pereopod; C, fifth pereopod; D, uropods, telson and last abdominal segment, dorsal. Unit of scales in mm.

and outer margins with numerous hairs distally; inner margin with 2 plumose distal setae and 1 spine on corner; outer corner rather inflated, with 4 long plumose setae. Propodus with 2 plumose medial setae and 1 simple distal seta on surface. Dactylus about 0.65 times as long as propodus, with numerous hairs on inner and outer margins; outer margin with 2 simple setae; terminal margin with 2 simple setae and 1 long setiform spine; terminal spine about twice as long as propodus. Exopod well developed.

First pereopod (Fig. 8D): Basis slightly longer than remaining articles combined, with 2 plumose distal setae on inner margin; outer corner with 1 simple seta. Ischium subequal to 1/2 of merus in length; outer corner with 1 simple seta. Merus with 1 simple seta, numerous hairs on inner margin; outer corner with 1 simple seta. Carpus about 1.8 times as long as propodus, with 5 simple setae and 1 membranous lamella on inner margin, and 1 short simple seta near outer margin. Propodus about with approximately 17 very long setae; outer margin with 1 simple seta. Dactylus about 3/4 of propodus, with 1 simple proximal seta on outer margin, and 4 simple setae and 2 very long setae near terminal margin.

Second pereopod (Fig. 8F): Basis about 1.4 times as long as remaining articles combined, with approximately 1 simple proximal seta, 2 hairy setae, 3 sensory setae and 9 short plumose setae; inner margin with numerous hairs proximally; outer corner with numerous hair. Carpus subequal to merus in length, with 2 simple setae on outer corner. Dactylus slightly longer than propodus, with 4 simple setae and 1 setiform spines on terminal margin.

Third pereopod (Fig. 9A): Basis about 0.8 times as long as remaining articles combined, with numerous hairs, 1 simple seta at middle portion of surface; inner margin with 1 simple seta and 3 sensory setae.

Fourth pereopod (Fig. 9B): Basis about 0.65 times as long as remaining articles combined, with 1 simple medial seta on surface; inner margin with 3 sensory setae.

Fifth pereopod (Fig. 9C): Basis about 0.7 times as long as remaining articles combined, with 5 sensory setae on surface; outer corner with 1 simple seta.

Telson and Uropod (Figs. 9D, E): Telson subcordate form (it is round form in other mature male), slightly shorter than length of last abdominal segment, subequal to  $2/3$  of uropodal peduncle; dorsal surface with 2 pairs of simple setae; both lateral margins with numerous hairs, several spinulose distally; terminal margin with 1 pair of small spines. Uropodal peduncle about 1.4 times as long as last abdominal segment, with 2 spines on inner margin (it has 3 spines and 2 simple setae in other mature male). Endopod not articulated, subequal to length of peduncle; inner margin serrated, with 4–6 spines; outer margin with 3 sensory setae; terminal margin with 1 plumose spine. Exopod composed of 2 articles, slightly shorter than endopod; first article slightly shorter than  $1/3$  of second article; second article slightly longer than  $2/3$  of endopod, with 1 distal simple seta; terminal margin with 1 short spine (bearing round tip and numerous hairs) and 1 plumose spine.

**Subadult female:** Body length (Fig. 10A) about 2.3 mm, excluding telson and uropod. Carapace (Figs. 10A, B) slightly longer than  $1/3$  of body length, about 1.85 times as long as its width and 1.7 times as long as its depth; shape nearly oval in dorsal view; surface glossy and smooth. Antero-lateral angle, pseudorostral lobe and ocular lobe almost same as in male. Thorax (Figs. 10A, B) slightly longer than carapace length,  $1/5$  of body length; third segment widest; fifth segment longest. Abdomen (Fig. 10A) almost same as in male.

Antennule (Fig. 10C): Peduncle composed of 3 articles; first article slightly longer than remaining articles combined, with numerous hairs, 1 sensory seta and 1 strong plumose seta on outer corner; second article with 1 sensory seta and 1 simple seta on outer corner; third article with 3 sensory setae outer corner and 2 simple setae near inner corner. Main flagellum composed of 3 articles; second article with 1 aesthetasc on inner corner; third article small, with 1 long and 1 short simple setae and 1 aesthetasc on terminal margin. Accessory flagellum composed of 3 articles, slightly longer than  $1/2$  of main flagellum; first article with 1 simple seta on outer corner; second article with 1 sensory seta on distal margin; third article with 1 sensory seta and 3 simple setae.

Third maxilliped (Fig. 10D): Basis about 1.25 times as long as remaining articles combined; inner and outer margins with numerous hairs; inner margin with 3 plumose distal setae, and 1 spine on corner; outer corner rather inflated, with 4 long plumose setae. Propodus with 2 plumose medial setae on inner margin, and 1 simple seta on outer corner. Dactylus subequal to propodus in length, with numerous hairs on inner margins; outer margin with 3 simple setae; terminal margin with 2

simple setae and 1 long setiform spine; terminal spine slightly longer than propodus. Exopod absent.

First pereopod (Fig. 10E): Basis about 0.8 times as long as remaining articles combined, with numerous hairs and 2 plumose distal setae on inner margin; outer corner with 2 plumose setae. Carpus about 1.65 times as long as propodus, with 5 simple setae, 1 membranous lamella on inner margin and 1 short simple seta on outer margin.

Propodus about with approximately 17 very long setae; with 2 simple setae on outer margin, and 1 simple seta near distal margin. Dactylus about 2/3 of propodus, with 2 simple proximal setae on outer margin, and 4 simple setae and 2 very long setae near terminal margin.

Second pereopod (Fig. 10F): Basis subequal to remaining articles combined, with 1 plumose seta on outer corner. Dactylus about 1.5 times as long as propodus, with 1 simple seta, 1 row of spinules on inner margin, and 4 simple setae and 1 setiform spine on terminal margin.

Third pereopod (Fig. 11A): Basis about 0.55 times as long as remaining articles combined, with 5 simple setae and 3 sensory setae on surface.

Fourth pereopod (Fig. 11B): Basis about 0.55 times as long as remaining articles combined, with 3 simple setae and 5 sensory setae on surface.

Fifth pereopod (Fig. 11C): Basis about 0.5 times as long as remaining articles combined, with 1 simple seta and 2 sensory setae on surface.

Telson and Uropod (Fig. 11D): Telson subcordate form, slightly shorter than length of last abdominal segment; dorsal surface with 2 pairs of simple setae; both lateral margins with numerous hairs, 1 pair of spines and several spinules distally; terminal margin with 1 pair of small spines. Uropodal peduncle slightly longer than telson, with 1 simple distal seta on inner margin, and 1 simple seta on distal margin. Endopod not articulated, subequal to length of peduncle; inner margin serrated, with 3 spines; outer margin with 2 sensory setae; terminal margin with 1 spine. Exopod composed of 2 articles, slightly shorter than endopod; first article slightly shorter than 1/2 of second article; second article slightly longer than 2/3 of endopod, with 1 short and 1 long simple distal setae near inner margin; terminal margin with 1 short spine (bearing round tip and numerous hairs) and 1 spine (bearing numerous hairs).

**Remarks.** This species was originally described on the basis of one mature female specimen from the Japanese waters (Gamô, 1961), its male was not known until now. We collected a few male and subadult female specimens of *Gynodiastylis rotundicaudata* from Korean waters. The species has similar formal carapace (its surface is grossly, smooth), first pereopod (its carpus bears a membranous lamella on inner margin) and telson (shape is round or subcordate, furnished with several pairs of spinules and a pair of spine) in both sexes.

A few differences are found between our subadult female specimens and holotype (mature female): (1) in the original specimen the carpus of first pereopod is about 1/6 as wide as its length, while it is about 1/3 in our subadult female specimens; (2) in the original specimen the telson is round form, while it is subcordate form in our subadult female and male specimens. But, in our other mature male specimen (body length 3.3 mm) it is round form. The uropodal endopod has 3 inner spines in the original specimen and our subadult female specimens, while it has 4 and 6 inner ones in our immature and mature male specimens, respectively. Therefore, these characteristics seem to be caused by age variation.

This species is very similar to *G. nitida* Harada, 1962 in having the subcordate telson and the unarticulated uropodal endopod. However, *G. rotundicaudata* is distinguished from *G. nitida* by the following: the carpus of the first pereopod is furnished with a membranous lamella on the inner margin. Also, the third maxilliped of *G. nitida* has 3 plumose setae on the outer corner, but it has 4 plumose ones in *G. rotundicaudata*.

**Distribution.** Korea (Yellow Sea and South Sea), Japan.

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## 요 약

Gynodiastylidae (코올챙이새우)과에 속하는 3 한국미기록종, *Gynodiastylis anguicephala* Harada, 1962, *G. tubicola* Harada, 1962 그리고 *G. rotundicaudata* Gamô, 1961이 확인되어 보고한다. 이들의 구기부 형질이 처음으로 기록되며, *G. rotundicaudata*의 수컷에 관한 기재는 학계에 처음으로 보고되어진다.